

## Translation of German patent publication 919,977

## A Roller Cage

The invention relates to roller bearing cages and more especially to needle roller cages having roller bodies individually guided and held in cage pockets. The invention is to provide a simply produced cage which is suitable for high valve speeds of rotation and requiring little space.

In the case of roller cages a distinction is made between two designs, namely those in which the roller bodies are only held in the cage pockets either in the inward or outward direction radially and are always employed in conjunction with an inner or, respectively, outer race ring and those in the case of which the roller bodies are held in the cage pockets both in the inward and also in the outward direction. The first sort is mainly utilized for short rollers and the latter is for needle rollers and may be installed directly, that is to say without race rings. The invention relates to the latter design of roller, and more particularly needle roller, cages. In the case thereof holding the roller bodies presents substantial problems, more especially when it is a question of extremely small roller diameters, as is commonly the case with needle roller bearings.

Needle roller bearing cages are known having roller bodies guided and held in pockets, which consist of a tube section, preferably of light alloy or metal, with stamped receiving pockets for the needle rollers. The holding of the needle rollers in this case is by small projections, which are subsequently pressed from ribs left between the individual pockets. Such pressed out spurs or projections are readily broken off during operation and cause bearing failure. There has also been a suggestion for holding the roller bodies in the cage pocket using suitably formed rib lugs, i. e. the pockets are not stamped out and instead of the material is crimped over inward (US patent 1,598,025). This cage is however only suitable for large roll diameters, since in the case of conventional needle roller diameters there is never enough material for overlapping.

In accordance with the invention the cage is constituted by two complete cylindrical cage rings provided with window-like openings to receive the roller bodies, such rings having different matching diameters, which, completely overlapping, are thrust over each other and connected together firmly by spot welding or the like. The cage ribs left between adjacent window openings have two narrow lateral sections placed close to each other, for guiding the

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roller bodies parallel to the axis and a widened middle section, bent fully to the outside or, respectively, to the inside, for holding the roller bodies.

As compared with the known roller cages the invention possesses many significant advantages. Owing to the division up of the cage into two cage rings made of comparatively thin sheet metal or tubing it is possible to make the ribs between the adjacent sections extremely narrow. The narrower cage rings in turn permit the accommodation of a larger number of roller bodies so that the load carrying capacity of the bearing is increased.

A further significant advantage is achieved by the interrupted individual guidance of the roller bodies, since this means that the stiction, that is to say the friction on starting to move, between the roller bodies and the cage is reduced so that the bearing may also be utilized for higher speeds of rotation, there nevertheless being satisfactory guidance parallel to the axis of the roller bodies by way of the two closely adjacent lateral rib sections. Owing to the offset of the center circle (due to the gap between the cage rings inserted into each other) of the cage of the cage rings, which are superposed, in relation to the center circle of the roller bodies it is possible to use the same window perforating tool for both cage rings. This means that the roller bodies are held resiliently in place by the cage windows of the outer ring and accordingly prevented from dropping out. The inner cage windows on the contrary serve not only for holding the roller bodies but also, owing to their improved fitting around the roller bodies, ensure radial guidance of the cage on the roller bodies.

The drawing shows one working example of the invention.

Figure 1 shows a part section taken through the roller cage on the line C - D in figure 2.

Figure 2 is a section taken on the line A - B in figure 1.

Figure 3 shows part of the roller cage in plan view.

The cage comprises the two cylindrical cage rings 1 and 2, which exactly fit into one another and are firmly joined together by a plurality of spot welds 3, distributed about the periphery, or in some other suitable fashion, for example by brazing or crimping. The production of the cage rings 1 and 2 takes place preferably by drawing a pot-like part, from which the bottom and the holding edge are subsequently removed, or also by cutting off on a lathe suitable parts of seamless, drawn tubing.

The two cage rings 1 and 2 are provided with window-like openings 4 and 5 of the same size and shape, which preferably are produced by a stamping technique. The ribs 6 and 7 left between the adjacent window openings have a widened middle rib part 8 and, respectively, 9, which, as shown in figure 2, is thrust outward and, respectively, inward to

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hold the roller bodies 10, i. e. to stop the same falling out of the cage, whereas the narrower lateral rib parts ensure axial guidance of the roller bodies 10.

The distance  $x$  between the opposite edge of the widened middle rib parts 8 and, respectively, 9 is somewhat less than the diameter of the roller bodies, which after manufacture of the cage are held resiliently in the window-like openings.

### Claims

1. A roller bearing cage and more especially a needle roller cage having roller bodies individually guided and held in cage pockets, characterized in that the cage is formed by two complete cylindrical cage rings provided with window-like openings to receive the roller bodies, such rings having different matching diameters fitting into each other, which, completely overlapping, are thrust over each other and connected together firmly by spot welding or the like and cage ribs left between adjacent window openings have two narrow lateral sections placed close to each other, for guiding the roller bodies parallel to the axis and a widened middle section, bent fully to the outside or, respectively, to the inside, for holding the roller bodies.

2. The roller cage as set forth in claim 1, characterized in that the cage middle circle constituted by the separating gap of the two cage rings inserted into one another is offset in relation to the roller body middle circle in an inward direction.

### References applied:

German patent publication 804,737

French patent publications 667,515, 555,293, 515,038

US patent 1,598,025.